



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/678,061	10/06/2003	Keitaro Imai	243648US2S	4099
22850	7590	02/23/2006	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			CHU, CHRIS C	
			ART UNIT	PAPER NUMBER
			2815	

DATE MAILED: 02/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/678,061

Applicant(s)

IMAI ET AL.

Examiner

Chris C. Chu

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 - 24 is/are pending in the application.
- 4a) Of the above claim(s) 2, 4, 6, 8, 10, 12, 14 and 16 - 24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3, 5, 7, 9, 11, 13 and 15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Request for Continued Examination***

1. A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on December 27, 2005 has been entered. An action on the RCE follows.

### ***Response to Amendment***

2. Applicant's amendment filed on December 27, 2005 has been received and entered in the case.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 3, 5, 7, 9, 11, 13 and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Imai et al. (JP 2002-289810).

Art Unit: 2815

Regarding claim 1, Imai et al. discloses in e.g., Fig. 1 a semiconductor device comprising:

- a semiconductor substrate (100; section 0055, line 3);
- a conductive plug (116; section 0059, line 3) electrically connected to the semiconductor substrate and including Si (polycrystalline silicon plug; section 0074, lines 3 – 5);
- a flat electrically conductive silicon carbide film (117; section 0060, lines 1 and 2) provided on the conductive plug;
- a flat electrode (120; section 0060, lines 6 and 7) comprising a noble metal (Pt; section 0060, line 6) provided above the silicon carbide film (117; see Fig. 1); and
- an adhesive layer (118; section 0060, line 3) provided between the silicon carbide film (117) and the flat electrode (120) and comprising a flat metal carbide film (section 0044, lines 1 – 5 and section 0081, lines 1 – 5) configured to adhere the silicon carbide film (117) to the electrode (120; since the flat metal carbide film in the layer 118 increases the attachment between the silicon carbide film 117 and the electrode 120, the layer 118 of Imai et al. reads as the adhesive layer).

Regarding claim 3, Imai et al. discloses in e.g., Fig. 1 the conductive plug (116) being electrically connected to an active region (107; section 0059, lines 5 and 6) of a transistor (MOS transistor) provided on the surface of the semiconductor substrate (100).

Regarding claims 5 and 7, Imai et al. discloses in e.g., Fig. 1 the metal carbide (section 0044, lines 1 – 5 and section 0081, lines 1 – 5) containing carbide of titanium.

Regarding claims 9, 11, 13 and 15, Imai et al. discloses in e.g., Fig. 1 the flat metal compound film (118; section 0060, line 3) further containing a compound of a metal contained in the metal carbide (TiC; section 0081, lines 1 – 5) and silicon (section 0079, lines 1 – 3).

### *Response to Arguments*

5. Applicant's arguments filed December 27, 2005 have been fully considered but they are not persuasive.

On page 9, applicant argues that Imai does not teach or suggest an adhesive layer for enhancing the adhesion properties between a silicon carbide film and an electrode. This argument is not persuasive. Since the flat metal carbide film in the layer (118) is formed by a chemical reaction between the metal layer (i.e., Pt) and the silicon carbide film (SiC), hence the bond between the metal layer (i.e., Pt) and the silicon carbide film (SiC) is stronger than any adhesive layer between two layers. In other words, the flat metal carbide film in the layer (118) works as an attaching material between the metal layer (i.e., Pt) and the silicon carbide film (SiC). Thus, the flat metal carbide film in the layer (118) enhances the adhesion properties between the silicon carbide film and the electrode as required by claim 1. Therefore, Imai et al. fully anticipates the claims.

Furthermore, applicant argues that if a silicon carbide film is formed on the metal film and a reaction is caused between these two films, the lamination of the metal carbide film/silicon carbide film/flat electrode might be obtained. However, this lamination is different from that of claim 1. This argument is not persuasive because Imai et al. clearly shows that the silicon carbide

Art Unit: 2815

film is formed under the metal film. Thus, the lamination of the metal carbide film/silicon carbide film/flat electrode is never obtained. Thus, the lamination of Imai et al. is always same as that of claim 1.

For the above reasons, the rejection is maintained.

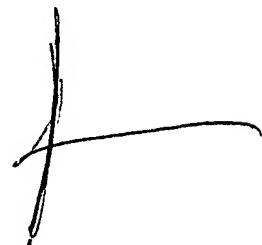
### *Conclusion*

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on 571-272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu  
Examiner  
Art Unit 2815



c.c.

Thursday, February 16, 2006

KENNETH PARKER  
SUPERVISORY PATENT EXAMINER